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REMARKS

Applicants appreciate the Examiner's thorough consideration provided in the present application. Claims 1, 2, 4, 7-10 and 12-24 are now present in the application. Claims 1 and 9 have been amended. Claims 1 and 9 are independent. Reconsideration of this application, as amended, is respectfully requested.

Claim Rejections Under 35 U.S.C. § 112

Claims 1 and 9 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, and rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In rejecting claims 1 and 9 under 35 U.S.C. § 112, first paragraph, the Examiner states: "the limitation 'wherein the liquid crystal material is emitted from the projecting portion substantially in the same direction as the resonator vibrates' was not described in the specification. As shown in FIG. 3 of the instant invention, the specification only describes that the projecting portion 126 is disposed under the resonating plate 124 and emits the liquid crystal 114 due to the vibration of the resonating plate which can vibrate with the same frequency as the resonator 122 (paragraphs 36 and 37). The specification does not disclose the direction of the vibration of the resonator 122." See page 2-3 of the Office Action.

Further, in rejecting claims 1 and 9 35 U.S.C. § 112, second paragraph, the Examiner states: "[i]t is not sure in what direction the resonator vibrates such that the liquid crystal material

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is emitted from the projection portion substantially in the same direction as the vibrator vibrates because the specification does not describe this subject matter." See page 3 of the Office Action.

The previously and currently added feature in claims 1 and 9, for example, "the liquid crystal material is emitted from the projecting portion substantially in the same direction, which is perpendicular to the substrate as the resonator vibrates" can be supported by the specification and inherency of the instant invention. For example, in FIG. 3, the resonator 122, the resonating plate 124, and the projecting portion 126 are arranged, for example, in a vertical direction, and the liquid crystal materials 114 are emitted in the vertical direction. Paragraph [0036] of the present application states that "[t]he resonator 122 generates vibration of a specific frequency according to an applied voltage and the resonating plate 124 is connected to the resonator so that it can vibrate with the same frequency. The projecting portion 126 is disposed under the resonating plate 124 and emits the liquid crystal materials due to the vibration of the resonating plate 124", and, paragraph [0037] of the present application states "[t]hen, the resonator 122 generates a vibration of a specific frequency and the resonating plate 124 also has a vibration of the same frequency. Accordingly, a constant projecting pressure is maintained in the projecting portion 126 and liquid crystal materials are emitted to a depositing portion 116 of the substrate 110 through the plurality of orifices 129 of the nozzle plate 128." These statements clearly and affirmatively state that the resonator 122 generates vibration, then the resonator plate 124 vibrates in the same direction as the resonator 122 vibrates, and then, due to this vibration, the projecting pressure in the projecting portion 126 is generated and the liquid crystal material 114 is emitted in the vertical direction. Since the liquid crystal materials 114 are emitted vertically, it is inherent that the projecting pressure is generated in the vertical direction. Further, since the

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projecting pressure is generated due to the vibration of the resonating plate 124 and the resonating plate 124 is disposed on the projecting portion 126, it is inherent that the resonating plate 124 vibrates in the vertical direction. Further, since the resonating plate 124 vibrates in the same direction as the resonator 122 vibrates, the resonator 122 vibrates in the vertical direction. That is, based upon the vertical arrangement of the above components and emitting direction of the liquid crystal materials, it is an inherent principle of the instant invention that the resonator 122 vibrates in the same direction as the direction in which the liquid crystal material is emitted. Accordingly, reconsideration and withdrawal of the rejection of claims 1 and 9 are respectfully requested..

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 4, 9, 10 and 12-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over von Gutfeld et al., U.S. Patent No. 6,055,035 (hereinafter "Gutfeld"), in view of D.E. Damouth, U.S. Patent No. 3,512,173 (hereinafter "Damouth"). Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gutfeld in view of Damouth, and further in view of Masazami et al., U.S. Patent No. 6,331,884 (hereinafter "Masazami"). These rejections are respectfully traversed.

These rejections are respectfully traversed and reconsideration is requested. The Examiner states on page 8 of the Office Action that he disagrees with Applicants' previous remarks since Damouth does not disclose the direction of the vibration of the piezoelectric 17. Since the Examiner concedes that Damouth does not disclose the direction of the vibration of the piezoelectric 17, Damouth fails to teach or suggest the liquid crystal emitted from the projecting

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portion substantially in the same direction as the resonator vibrates, as recited in the claimed invention.

Further, Damouth discloses in column 2 lines 17-21 that "[u]nder normal operating conditions, the ink forced into the nozzle 12 is ejected from the orifice 14 under pressure generated from source 13. The pressure, in the absence of controls to be described, is adequate to cause the ink to be ejected in a continuous stream" and discloses in column 2 lines 26-50 that "[i]t has been found that by applying controls to the stream the droplet breakup becomes very regular, and surprisingly uniformly shaped droplet are formed. To achieve this result in accordance herewith, nozzle 12 is vibrated at an ultrasonic rate which in the preferred embodiment is at a frequency vibration on the order of approximately 30 kc...In a preferred embodiment, as illustrated, a mechanical structure 18, comprising a rigid plate member or the like, snugly surrounds the nozzle end...Being connected directly to the nozzle, plate 18 causes vibration thereof at the transmitted frequency which is effective in uniformly controlling size and breakup rate of the ejecting ink stream to produce the uniform droplets 22." That is, the piezoelectric crystal 17 generates vibration, then the plate member 18 vibrates in the same direction as the piezoelectric crystal 17, and then the transmitted vibration breaks up the continuous stream of the ink under the pressure generated from the source 13 to produce the uniform droplets. Since the ink is pushed down in the vertical direction due to the pressure generated from the source 13 to eject the ink in the vertical direction, the vibration at the nozzle end should be in the horizontal direction to break up the continuous stream of the ink. If the vibration at the nozzle end were in the vertical direction, the vibration could not affect to break up the continuous stream of the ink. Accordingly, it is inherent that the vibration of the nozzle

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end is in the vertical direction and the plate member 18 directly connected at a right angle to the nozzle end vibrates the nozzle 12 in the vertical direction. Since the plate member 18 vibrates in the horizontal direction, it is inherent that the piezoelectric crystal 17 vibrates in the horizontal direction. Accordingly, it is an inherent principle of Damouth that the piezoelectric crystal 17 vibrates in the direction perpendicular to a direction in which the liquid crystal material is emitted.

Further, none of the cited references teaches or suggests a feature, for example, "the substrate having a seal pattern and a black matrix at a region corresponding to the seal pattern," as recited in the claimed invention.

For at least these reasons, Applicants respectfully submit that claim 1 and its dependent claims 2, 4, 7-8, 15, 17-18 and 21-22, and claim 9 and its dependent claims 10, 12-14, 16, 19-20 and 23-24 are allowable over the cited references.

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CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

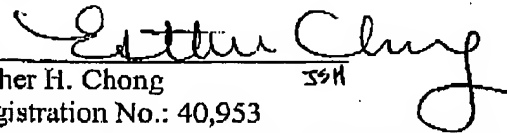
If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Jun S. Ha, Registration No. 58,508, at (703) 205-8000, in the Washington, D.C. area.

Prompt and favorable consideration of this Amendment is respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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